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RESULTS OF THE ALCOA FOUNDATION-SURINAME EXPEDITIONS. VI. ADDITIONAL CHROMOSOMAL DATA FOR BATS (MAMMALIA: CHIROPTERA) FROM SURINAME

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ABSTRACT

As part of ongoing studies of the bats of Suriname, karyotypic information is presented for 17 species. Chromosomal data are presented for the first time for *Peronymus leucopterus, Peropteryx macrotis, Mimon bennettii, Artibeus concolor, Furipterus horrens,* and *Thyroptera discifera.* Additional chromosomal data are presented for 11 other species of bats for which some information was available previously.

INTRODUCTION

As part of an ongoing study of the mammalian fauna of Suriname, we have examined the karyotypes of 17 species of bats (Table 1). No

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karyotypic data have been published for six of the species. Of the other 11 species, these are the first karyotypic data based upon Surinamese specimens for six species and we have additional information for five species discussed by Honeycutt et al. (1980). The specimens reported herein are part of the sample which formed the basis for the report by Genoways et al. (1981) on bat records for Suriname. They discuss the reasons for conclusions concerning specific identification. In those cases where our data are indistinguishable from those in the literature, we have simply presented the information on Table 1 and Specimens Examined. Accounts are given for those species where the data warrant them.

Methods and Materials

Standard karyotypes were prepared from *in vivo* bone marrow techniques (Baker, 1970). A minimum of five spreads were examined per specimen. G-banded karyotypes were prepared from fibroblast cultures (Patton and Baker, 1978).

Species Accounts

Cormura brevirostris (Wagner)

2n = 22; FN = 40

Karyotype of a male of this species from Leticia, Colombia, was reported by Baker and Jordan (1970). The karyotype of this single individual was unique among bats in that the total size of the X-chromosome was over 30% of the haploid genome, and in that the largest pair of autosomes was heteromorphic in the length of the short arm. We have examined six males and one female of this species from Suriname and find this uniquely large X-chromosome to be characteristic of all individuals. The autosomal heteromorphism noted in the Colombian specimen was also present in our sample.

Peronymus leucopterus (Peters)

Fig. 1, 2n = 48; FN = 62

This species has the highest diploid number thus far reported for an emballonurid (Baker, 1970; Baker and Jordan, 1970). If many of the short arms in the autosomal complement are assigned fundamental values, the fundamental number could be as high as 78. Unlike the karyotype of most other emballonurids, there is little variation in size of the chromosomes in the karyotype of this species, with the 23 pairs of autosomes consisting of a gradated series of medium-sized elements. The largest pair of autosomes are approximately the size of the X-chromosome. The X-chromosome is a medium-sized submetacentric and the Y-chromosome can not be identified unequivocally. However, it is probably one of the smaller elements. A comparison of Figs. 1 and 2 will quickly reveal that the karyotype of *Peronymus* would have to

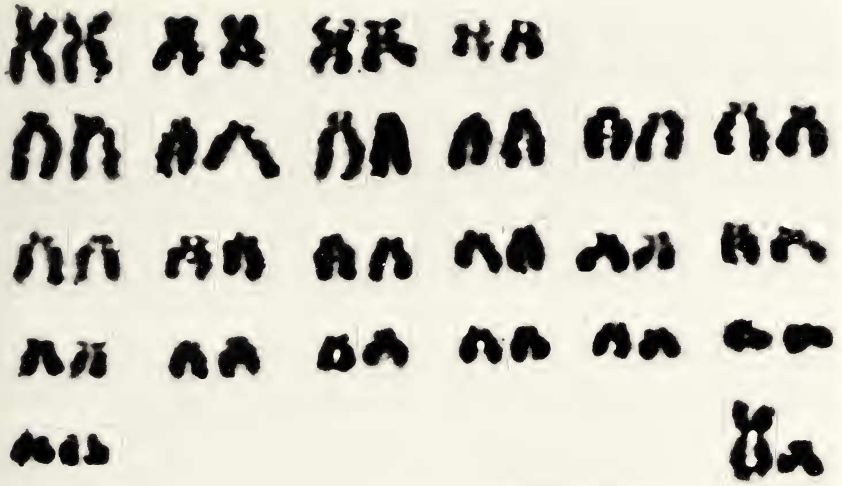

Fig. 1.—Representative karyotype of a male *Peronymus leucopterus* from Suriname: Para; Zanderij.

undergo many chromosomal rearrangements to become like that of *Peropteryx macrotis*. For example, in the karyotype of *Peronymus*, all autosomes are essentially the same size or smaller than the X-chromosome, whereas in *Peropteryx* all autosomes are equal to or larger

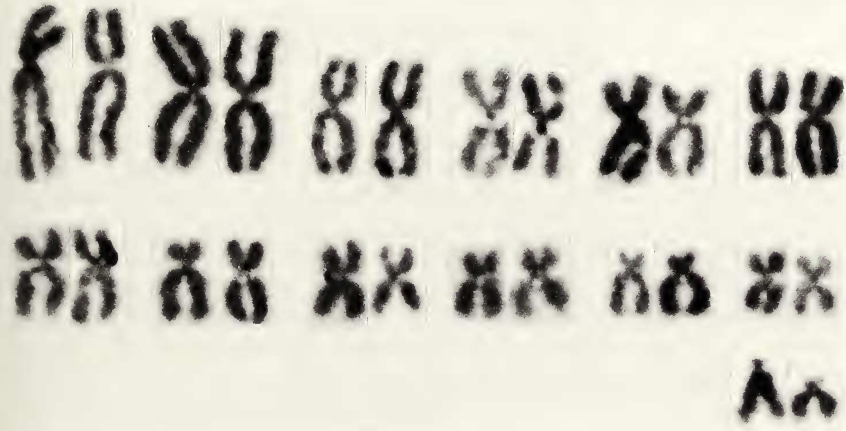

Fig. 2.—Representative karyotype of a male *Peropteryx macrotis* from Suriname: Saramacca; Voltzberg.

than the X-chromosome. This means that if the X-chromosome is the same size in the two karyotypes then essentially all elements would need to be rearranged to relate the two karyotypes.

Peropteryx macrotis (Wagner)
Fig. 2, 2n = 26; FN = 48

The autosomes of this species are composed of 11 pairs of metacentric or submetacentric elements plus one pair of subtelocentric elements. The pair of autosomes in Fig. 2 that are fourth from left in the top row have a secondary constriction proximal to the centromere on the lower arms. The X-chromosome is a medium-sized, near acrocentric chromosome and the Y-chromosome is also a near acrocentric chromosome that is about half the size of the X-chromosome. The published karyotypic data for other emballonurids (Baker, 1970; Baker and Jordan, 1970; RayChaudhuri and Pathak, 1966) fail to reveal a karyotype that is grossly similar to either *Peropteryx* (Fig. 2) or *Peronymus* (Fig. 1). See also the account for *Peronymus* for discussion of the relationships of *Peronymus* and *Peropteryx*.

Lonchorhina aurita Tomes
2n = 32; FN = 60

Karyotype of this species has been reported by Baker and Hsu (1970) and Baker (1973). The karyotype is essentially like that reported by these authors, except that in a smaller pair of autosomes the short arm is reduced to a point where the element may appear acrocentric in overcontracted spreads. Whether or not this represents geographic variation is unclear at this point.

Micronycteris hirsuta (Peters)
2n = 30; FN = 32

There are two karyotypes reported for *Micronycteris hirsuta* (Baker et al., 1973; Baker, 1979). Specimens from Middle America have a diploid number of 30, whereas specimens from Trinidad have a diploid number of 28. The three specimens from Suriname have a karyotype like that reported for Middle American specimens. The fact that the 2n = 30 karyotype has been reported northwest of Trinidad in Middle America and southeast of Trinidad in Suriname would suggest the strong possibility that the 2n = 28 karyotype may be restricted to Trinidad.

Micronycteris minuta (Gervais)
2n = 28; FN = 52

There does not appear to be much difference between the karyotype of our specimen and the specimen figured by Baker (1979: Pl. 6), ex-

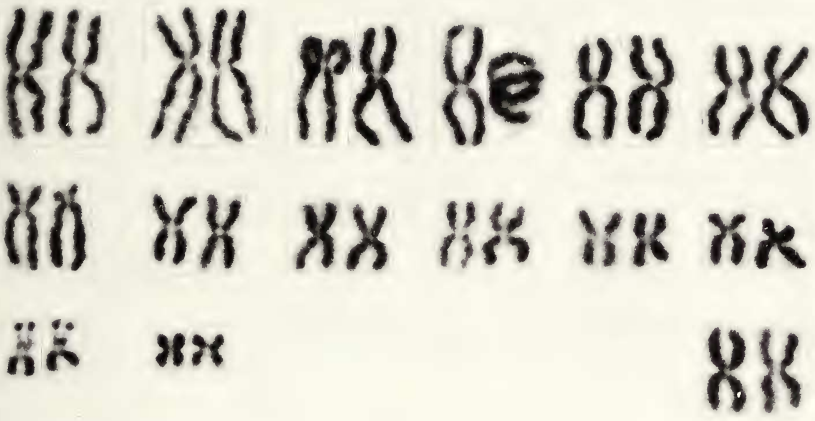

Fig. 3a.—Representative karyotype of a female *Mimon bennettii* from Suriname: Saramacca; Voltzberg.

cept that the smallest pair of autosomes is distinctly biarmed in the Suriname specimen, whereas the homologous pair in the specimen from Trinidad was more acrocentric in nature.

Mimon bennettii (Gray)
Fig. 3, 2n = 30; FN = 56

The autosomal complement of this species consists of a gradated series of biarmed elements ranging from large to medium. The X-chromosome is a medium-sized metacentric element and Y-chromosome is minute. All autosomes except the pair discussed below are submetacentric or metacentric. Each chromosome of one of the three smallest pairs has two secondary constrictions. This particular chromosomal configuration of secondary constrictions has not been recorded in any other phyllostomid species thus far studied.

In the seventh largest pair of autosomes there is a chromosomal polymorphism. Both chromosomal morphs are subtelocentric; however, one morph clearly has a more telomeric placement of the centromere than does the other, which might be called subtelocentric or submetacentric depending upon the spread available. This polymorphism is shown in Fig. 3a as the first pair on the second row. The G-banding pattern and nature of the polymorphism are shown in Fig. 3b. The rearrangement which has resulted in this polymorphism is probably a pericentric inversion (Fig. 3b). Based on standard karyotypes, all four individuals examined possessed this polymorphism. It is of interest to note that a similar polymorphism (involving three morphs)

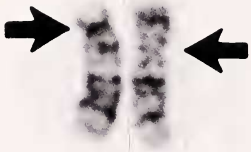

Fig. 3b.—G-banded preparation of the seventh largest pair of autosomes of the *Mimon bennettii* to show the nature of the chromosomal polymorphism in this species. Arrows indicate the positions of the centromeres.

has been reported for *Mimon crenulatum* (Baker et al., 1972); however, in *M. crenulatum* the polymorphism involves the fifth largest pair of autosomes.

Some authors have considered *Mimon bennettii* and *Mimon cozumelae* to be conspecific (Schaldach, 1965; Jones, 1966; Goodwin, 1969), whereas others have considered them to be distinct species (Carter et al., 1966; Gardner et al., 1970; Jones and Carter, 1976; Husson, 1978). Minimally the karyotype of one species must go through two rearrangements to be converted to the karyotype of the other (see Baker, 1979, for chromosomal data for *M. cozumelae*). As chromosomal races are uncommon in phyllostomid bats these data indirectly suggest that *M. bennettii* and *M. cozumelae* will prove to be specifically distinct.

Tonatia carrikeri (J. A. Allen)
Fig. 4, 2n = 26; FN = 46

A diploid number of 26 and fundamental number of 46 were reported by Gardner (1977) for this species based upon material from Peru. Our specimen, a female, has these same values. As a karyotype of this species has not been published, one is shown in Fig. 4.

Choeroniscus intermedius (J. A. Allen and Chapman)
2n = 20; FN = (36)

The karyotype of this species is figured in Honeycutt et al. (1980: Fig. 7). The karyotype of another female from Zanderij is essentially like the one figured except that in the third largest pair of autosomes there is a polymorphism. One element is subtelocentric as previously figured, whereas the other element is submetacentric. One of us (Baker) has examined the karyotypes of several specimens of this species from Trinidad and has found a similar polymorphism in the third largest pair of autosomes. Other polymorphisms were also found in the Trinidadian specimens.

Table 1.—*Chromosomal data for bats from Suriname. Symbols are 2n, diploid number; FN, fundamental number; M, metacentric; SM, submetacentric; ST, subtelocentric; A, acrocentric.*

Taxon	2n	FN	X	Y	Source of photograph of karyotype	Number of specimens reported in this study ♂	♀
Emballonuridae							
Cormura brevirostris	22	40	M	A	Baker and Jordan, 1970	5	2
Peronymus leucopterus	48	62	SM	SM	This paper	1	
Peropteryx macrotis	26	48	ST	ST	This paper	4	3
Saccopteryx leptura	28	38	SM	M	Baker and Jordan, 1970	1	
Phyllostomidae							
Phyllostominae							
Lonchorhina aurita	32	60			Baker, 1979		3
Micronycteris hirsuta	30	32			Baker, 1979		3
Micronycteris minuta	28	52	ST	A	Baker, 1979	1	
Micronycteris nicefori	28	52	SM	A	Baker, 1979	1	
Mimon bennettii	30	56	SM	A	This paper	1	3
Tonatia carrikeri	26	46			This paper		1
Tonatia schulzi	28	36	A	A	Honeycutt et al., 1980	2	
Glossophaginae							
Choeroniscus intermedius	20	(36)			Honeycutt et al., 1980		1
Glossophaga soricina	32	60			Baker, 1979		1
Carolliinae							
Rhinophylla pumilio	34	64	SM	A	Honeycutt et al., 1980	1	3
Stenodermatinae							
Artibeus concolor	31	56	ST	A-A	This paper	1	
Furipteridae							
Furipterus horrens	34	62			This paper		1
Thyropteridae							
Thyroptera discifera	32	38	SM	A	This paper	1	

Artibeus concolor Peters
Fig. 5, 2n = 31; FN = 56

Artibeus concolor has a diploid number of 31 in our male specimen, which is not unexpected because most other species of *Artibeus* have

Fig. 4.—Representative karyotype of a female *Tonatia carrikeri* from Suriname: Para; Zanderij.

a diploid number of 31 in males. Autosomally, *A. concolor* is similar to other species in this genus with 10 pairs of submetacentric or metacentric elements and four pairs of subtelocentric elements. The two Y-chromosomes are acrocentric. There are currently 12 species recognized in the genus *Artibeus* (Baker, 1979); of these all but *A. phaeotis* and *A. watsoni* have two Y-chromosomes in males. The single biarmed Y-chromosome of *A. phaeotis* and *A. watsoni* appears to be a valuable taxonomic character. With the addition of data from *A. concolor,* all currently recognized species of *Artibeus* are known karyotypically.

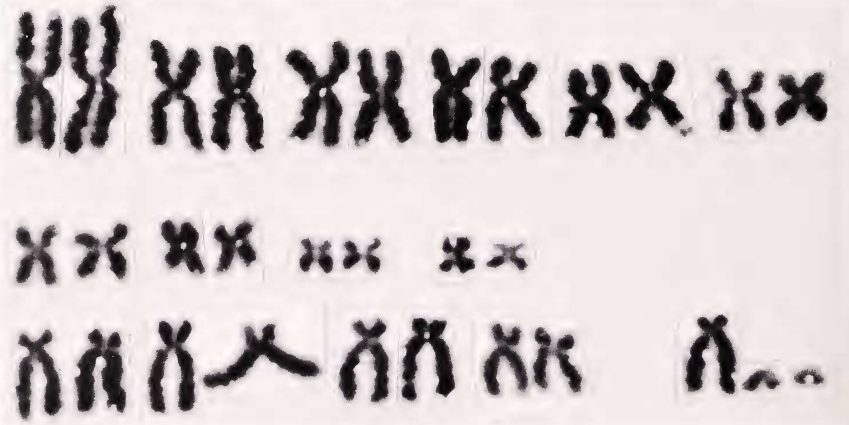

Fig. 5.—Representative karyotype of a male *Artibeus concolor* from Suriname: Para; Zanderij.

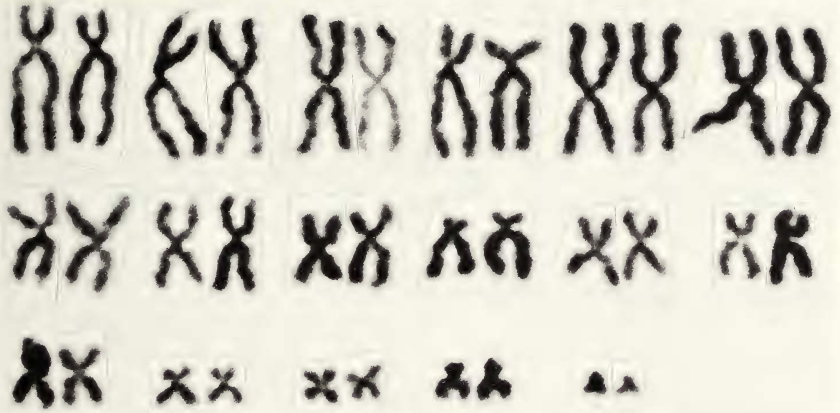

Fig. 6.—Representative karyotype of a female *Furipterus horrens* from Suriname: Saramacca; Voltzberg.

Furipterus horrens (Cuvier)
Fig. 6, 2n = 34; FN = 62

The karyotype of this species consists of a gradated series of biarmed elements ranging from large to small plus a pair of small acrocentric chromosomes. Three of the larger pairs are subtelocentric in nature (large arm is more than twice the length of the short arm). The remainder of the biarmed elements are submetacentric or metacentric chromosomes. As only a female was examined the sex elements could not be determined.

These are the first chromosomal data reported for this family. The diploid, fundamental values, and karyotypic characteristics are well within the range of values for other bats.

Thyroptera discifera Lichtenstein and Peters
Fig. 7, 2n = 32; FN = 38

The autosomes of this disk-winged bat consist of four pairs of biarmed elements plus a gradated series of 11 pairs of acrocentric elements. Of the biarmed autosomes, the second largest pair approaches a subtelocentric placement of the centromere. The other three pairs of biarms have a submetacentric or metacentric centromere placement. The X-chromosome is a metacentric element which is larger than any biarmed autosome. The Y-chromosome is tentatively identified as an acrocentric element about half the size of the X-chromosome.

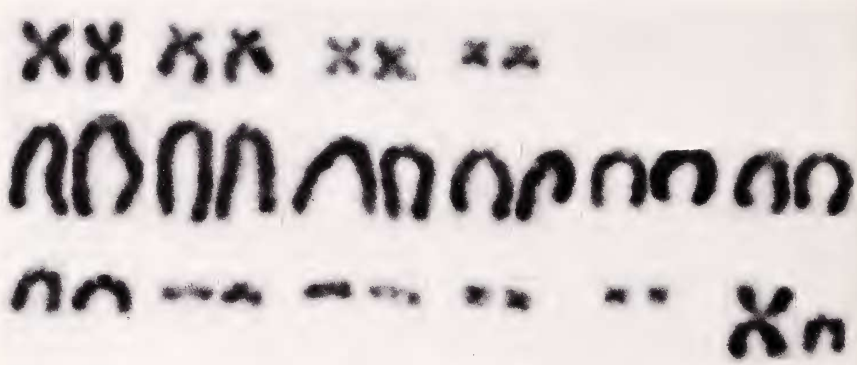

Fig. 7.—Representative karyotype of a male *Thyroptera discifera* from Suriname: Saramacca; Raleigh Falls.

The karyotype of the only other species in the family Thyropteridae, *T. tricolor,* was reported by Baker (1970) and Honeycutt et al. (1980). The karyotype of *T. discifera* can be derived from that of *T. tricolor* by four centric fusions, plus events which would change the acrocentric X-chromosome to a biarmed element and an enlargement of the Y-chromosome. Baker and Bickham (1980) reviewed the magnitude of change that generally distinguishes congeneric species and found that most differ by fewer than six chromosomal rearrangements. However, some congeneric species were distinguished by as many as 20 rearrangements. If the standard karyotypes in this case are reflective of the magnitude of chromosomal evolution that distinguishes these two species (see Haiduk et al., 1981), then we interpret this variation between *T. discifera* and *T. tricolor* as being well within the range which characterizes congeneric species of bats thus far studied.

SPECIMENS EXAMINED

Cormura brevirostris.—NICKERIE: Avanavero, 4°52′N, 57°21′W (♀, CM 68554); PARA: Zanderij, 5°27′N, 55°12′W (5♂, CM 68370–73, 68555; ♀, CM 68556).

Peronymus leucopterus.—PARA: Zanderij, 5°27′N, 55°12′W (♂, CM 68374).

Peropteryx macrotis.—SARAMACCA: Voltzberg, 4°40′N, 56°12′W (4♂, CM 68377–80; 3♀, CM 68376, 68557–58).

Saccopteryx leptura.—SARAMACCA: Voltzberg, 4°40′N, 56°12′W (♂, CM 68383).

Lonchorhina aurita.—NICKERIE: Avanavero, 4°52′N, 57°21′W (3♀, CM 68385–86, 68637).

Micronycteris hirsuta.—NICKERIE: Kabalebo, 4°51′N, 57°24′W (♀, CM 68638). PARA: Zanderij, 5°27′N, 55°12′W (2♀, CM 68387–88).

Micronycteris minuta.—SARAMACCA: Voltzberg, 4°40′N, 56°12′W (♂, CM 68391).

Micronycteris nicefori.—NICKERIE: Kabalebo, 4°51′N, 57°24′W (♂, CM 68643).

Mimon bennettii.—SARAMACCA: Voltzberg, 4°40′N, 56°12′W (♂, CM 68663; 3♀, CM 69393–95).

Tonatia carrikeri.—PARA: Zanderij, 5°27′N, 55°12′W (♀, CM 68400).
Tonatia schulzi.—NICKERIE: Kayserberg Airstrip, 3°06′N, 56°29′W (♂, CM 68706). SARAMACCA: Raleigh Falls, 4°44′N, 56°12′W (♂, CM 68409).
Choeroniscus intermedius.—PARA: Zanderij, 5°27′N, 55°12′W (♀, CM 68413).
Glossophaga soricina.—PARA: Zanderij, 4°27′N, 55°12′W (♀, CM 68414).
Rhinophylla pumilio.—PARA: Zanderij, 5°27′N, 55°12′W (♀, CM 68869). SARAMACCA: Raleigh Falls, 4°44′N, 56°12′W (♀, CM 68887); Voltzberg, 4°40′N, 56°12′W (♂, CM 68891; ♀, CM 68890).
Artibeus concolor.—PARA: Zanderij, 5°27′N, 55°12′W (♂, CM 68421).
Furipterus horrens.—SARAMACCA: Voltzberg, 4°40′N, 56°12′W (♀, CM 68439).
Thyroptera discifera.—SARAMACCA: Raleigh Falls, 4°44′N, 56°12′W (♂, CM 68440).

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